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Statewide Contributors and Reviewers:

Washington State Geospatial Hydrography Data Standards Business Case

GIS Workgroup Draft

Version 0.3

November 4, 2010

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1. Executive Summary

This document establishes the business case for the state to adopt the U.S. Geological Survey (USGS) National Hydrography Dataset (NHD) as the data standard for all surface water (hydrography) geospatial datasets in Washington state.

The common data set will be the National Hydrography Dataset (NHD), which is the standard now utilized by Ecology and the federal agencies in the Pacific Northwest Hydrography Framework (PNWHF).

The use of the common linear referencing system in the NHD will not only facilitate data sharing between the Washington state agencies but also with the adjacent states of Oregon and Idaho as well as many other federal agencies.

The state recognizes migration to this standard may require a significant amount of time and money. Adherence to this standard by individual state agencies and organizations is subject to the availability of funding.

1.1. Current Situation

The state needs a common hydrography dataset, Currently, the Departments of Fish and Wildlife (WDFW), Ecology (ECY), and Natural Resources (DNR) each manage discrete geospatial data sets of surface waters (streams, rivers, lakes, ponds, estuaries, etc.) to meet their business needs.

There is often little agreement between the three discrete data sets. The number and location of streams differs as do the unique stream identifiers, making it impossible in many cases for the agencies to share feature attributes. Reporting and analytical results will differ depending on which agency's data set is utilized.

A common surface water dataset is needed in order to improve regulatory decision-making, establish priorities for watershed restoration activities, and improve management of the state's natural resources.

1.2. Key Terms

- Dataset – a geodatabase containing the points, lines and polygons representing physical features on a portion of the earth's surface along with related attribute data.
- Data model – a method for describing a structured set of data. The NHD model provides a way of classifying the layers representing physical hydrography and hydrology features and their relationships.
- Event tables- contain information about assets, conditions, and other water related attributes that can be located along routed features. Examples would include changes in fish presence and changes in stream gradient.
- Hydrography - the science of the measurement, description, and mapping of the surface waters of the earth. Surface waters include streams, rivers, lakes, ponds, estuaries, etc.
- Linear Referencing - the method of storing geographic locations by using relative positions along a measured linear feature. Distance measures are used to locate events along the linear features. A similar example is the use of mileposts to measure distances along highways.

- National Hydrography Dataset (NHD). The NHD is a comprehensive set of digital spatial data representing the surface waters of the United States using common features such as lakes, ponds, streams, rivers, canals, and oceans.
- Reach Code – a nationally unique flowline (stream segment) identifier
- Route – linear features such as roads and streams that have a defined measurement system.
- Watershed Boundary Dataset (WBD) - A standardized system for organizing hydrologic data which divides the country into successively smaller hydrologic units (levels) based on topography. Sub-basins, watersheds and sub-watersheds (4th, 5th and 6th levels) are of primary interest to most users.

2. Proposed Data Standard and Scope

The U.S. Geological Survey (USGS) National Hydrography Dataset (NHD) shall be the data standard for all surface water (hydrography) geospatial datasets in Washington state.

The current published version of the NHD stewarded by the Washington Department of Ecology (ECY) will be the official state version for linework, points, areas, stream routing, and NHD defined attributes representing surface water hydrography.

- Agencies shall use the NHD for newly designed or significantly redesigned agency geographic information systems.
- Agencies shall use the NHD Data Dictionary that provides common structure to promote data sharing (See Appendix A – NHD Data Dictionary.)

The update frequency of the statewide published version of NHD will be determined by the Washington State Hydrography Steering Committee .

Each published version will be identified by a unique version number. ECY will make retired versions available for use by stakeholders for no less than 12 months from the date of retirement.

Under this standard, agencies may use alternative surface water conventions and structures provided:

- The agency maintains a version of hydrographic features which preserve spatial consistency with NHD geometry currently published by ECY.
- Any hydrographic variations introduced by the agency are posted to the USGS managed National NHD repository and made available in the next publication cycle.
- The agency maintains a version of hydrography related attributes for ISB-GIT defined significant geo-datasets which can be accurately mapped to the ReachCode routing system contained in the currently published ECY version of the NHD.

Recognizing that migration to this standard may require a significant amount of time and money, adherence to this standard by individual state agencies and organizations is subject to the availability of funding. See Appendix B: Implementation Plan.

2.1. Assumptions

Until the state has funding to completely migrate, agencies may use alternative surface water conventions and structures provided:

- The agencies actively participate in the proposed shared governance model and openly communicate current and future strategies.
- When possible and as opportunities become available, agencies modify portions of their datasets to facilitate eventual migration to the NHD.

2.2. State Sponsorship - Executive and Business Sponsors

- The Department of Ecology is the primary Business Sponsor and Primary Steward.
- Executive sponsors are: Department of Ecology, Department of Fish and Wildlife, Department of Natural Resources, Department of Health, and the Washington Geographic Information Council (WAGIC).

2.3. Strategic Alignment

- Washington State GIS Strategic Plan, 2010-2014, Goal 4 -
- 2008-2014 State Strategic IT Plan Goals and Strategies [**SSITP**].

2.4. Related Initiatives/Major Systems

The NHD is a national framework for the spatial position of surface water features, their attribution, their connectivity in a flow network, and an addressing system for linking additional related data known as events, The U.S. Geological Survey (USGS) is the owner and primary data steward of the NHD. Currently, over forty states are active participants in the NHD.

The Pacific Northwest Hydrography Framework (PNWHF) Partnership includes the Bureau of Land Management, U.S. Forest Service, and the states of Oregon and Washington. The PNWHF Partnership fosters a strategic vision for the creation, stewardship, and use of the NHD in Washington and Oregon.

Roles and responsibilities for maintaining the NHD are included in a Memorandum of Understanding between the PNWHF and the USGS. To review the MOU, go to http://webhosts.cr.usgs.gov/steward/, click on WA state, and the select the link to view the MOU document.

3. Introduction and Background

Currently, the State of Washington does not have a single source for surface water (hydrography) data. There are three different sets being used to make regulatory decisions. As a result, inconsistent and conflicting decisions are reached on cross-agency natural resource and environmental permits.

The Hydrography Data Standards Business Case proposal features a consolidated hydrography data set, jointly managed by stakeholder agencies and maintained by the Department of Ecology.

The Departments of Fish and Wildlife (DFW), Ecology, and Natural Resources (DNR) are working to bring together their operational, regulatory surface water geospatial data layers (stream typing, water quality, fish habitat) into one jointly managed and maintained enterprise data set. The dataset will be compatible with the National Hydrography Dataset (NHD) High Resolution Geodatabase.

Hydrography data is a critical base data element used to support Washington State's mission of protecting the environmental quality of the air, land, and water resources of Washington state. The objective of this standard is to designate a single, common hydrography data model for agency geospatial data, geographic information systems, and data exchanges.

The NHD is a comprehensive set of digital spatial data representing the surface water of the United States using common features such as lakes, ponds, streams, rivers, canals, and oceans. These data are designed to be used in general mapping and in the analysis of surface-water systems using geographic information systems (GIS).

The NHD is a set of digital geospatial data that encodes information about naturally occurring and constructed bodies of water, paths through which water flows, and related features.

The primary features making up the nation's surface water are labeled with nationally unique and permanent identifiers known as the reach code. This gives features an identity for inventory and analysis. The network of lines contains linear measurements, making it possible to locate the position of features along a stream or beside a lake.

By recording the measurements of features on a reach, it is possible to uniquely identify any position along the state's waterways. The system of linear referencing also makes it easy for any agency to link its data to the NHD without having to customize the NHD.

The NHD data model was designed to allow local stewards to improve upon the existing NHD and keep it continuously updated. Input from local stewards, knowledgeable about the hydrography in their local areas, assures that the NHD is accurate, current, and meets the objectives of the user community.

The NHD includes a number of change management characteristics that keep track of the NHD features from their original production through their entire maintenance history. As stewards maintain the NHD, a complete record of the actions taken are recorded in the NHD to allow future users to fully understand the processes the data have undergone. The NHD dataset contains feature level metadata and information that supports future updates and improvements

3.1. Why is the standard needed? What problem/opportunity does it solve?

- The lack of a consistent statewide hydrography layer:
  - hinders cross-agency data sharing and decision making
  - can result in errors, unnecessary misunderstandings and conflicts
- A common hydrography layer
  - helps to avoid duplication of effort by making a single, integrated hydrography layer available to a wide range of users.
  - Provides a process for state Framework data integration efforts across Washington state.
  - Strengthens interagency relationships and decision making.
  - Provides the base data set needed for sharing fish habitat- and water quality-related attribute data across Washington state.
- Stakeholders have supported the development of a consolidated, state-wide GIS data set. In a September 2007 letter to the Office of Financial Management and to the legislature, the Forum on Monitoring Salmon Recovery and Watershed Health listed development of a common hydrography data layer as one of its highest priorities and fully consistent with the "Washington Comprehensive Monitoring Strategy and Action Plan for Watershed Health and Salmon Recovery (CMS)".

3.2. Who are the early adopters?

- Department of Ecology

- Department of Fish and Wildlife
- Pilot for Hydrography Integration to NHD. A pilot project with Department of Ecology, Department of Fish and Wildlife, Department of Natural Resources, and Department of Health
- Federal partner agencies including USFS, BLM, NRCS, EPA
- Neighboring states of Oregon, Idaho and Montana.

3.3. What lines of business (business areas) may benefit?

- Utilizing a standard hydrography dataset will benefit natural resource agencies, property owners and private organizations doing environmental analysis requiring hydrography as a data input. This can include organizations involved in performing watershed analysis, mapping fish habitat and fish distribution, studying slope stability and debris flows, landscape vulnerability to climate change, riparian area management, determining the impact of road construction and road management on riparian areas.
- Any public business, person or stakeholder requiring consistent responses from state agencies when those responses involve the utilization and analysis of hydrographic data.

3.4. Benefits

- Reduce or eliminate the duplication of effort required to manage three different state-wide data sets.
- Reduce risk, improve data quality, and help manage costs
- Facilitate data exchanges for key datasets,
- Reduce staff time spent converting between differing alignments, route systems and measures,
- Minimize error introduction brought on by the need to convert between differing alignments, route systems and measures, and
- Enable on the fly integration of distributed and separately maintained geo-datasets.
- Meet GIS Strategic Plan Goal 4 intent by setting a statewide standard for hydrographic data. This increases the effectiveness of the data discovery and access mechanism, the ease of integrating datasets from multiple sources, and will improve the quality of data used by Washington's geospatial community.
- Meet Washington State Strategic IT Plan Goals:
    - Goal 2 to promote data sharing.
    - Goal 3 to promote common IT practices including data standards
    - Goal 4 to provide an integrated end user experience through common methodologies for data management

3.5. Standardization Impacts

- Washington natural resources agencies are heavily invested in their existing hydrography data layers. Migration to any data standard that is significantly different from their current data model will involve a substantial staff time, funding, and stakeholder review.
- Due to lack of funding, not all agencies are expected to migrate existing major hydrography datasets.

3.6. Business Sponsors Endorsement

3.6.1. Statutory Authority

- RCW 43.105.041 details the powers and duties of the Information Services Board (ISB), including the authority to develop statewide or interagency information services and technical policies, standards, and procedures.

3.6.2. Stakeholder Roles and Responsibilities

- See Section 5. Governance

3.6.2.1. Executive Sponsors

- The Department of Ecology is the primary Business Sponsor and Steward.
- Executive sponsors are: Department of Ecology, Department of Fish and Wildlife, Department of Natural Resources, Department of Health, and the Washington Geographic Information Council (WAGIC).

3.7. Steering Committee

The Washington State Hydrography Steering Committee will be composed of:

- A representative of the WA Department of Ecology (ECY)
- A representative of the WA Department of Natural Resources (DNR)
- A representative of the WA Department of Health(DOH)
- A representative of the WA Department of Fish and Wildlife (DFW)
- A representative of the US Bureau of Land Management (BLM)
- A representative of the US Forest Service Region 6 (USFS)
- A representative of the Northwest Indian Fisheries Commission (NWIFC)
- The Washington State GIS Coordinator
- Other representatives may be appointed by the ISB GIT

3.7.1.1. Business and Technical Data Stewards

- ECY, WDFW, DNR

3.8. Key Issues or Decisions

- Ability to migrate or future migration - The three state agencies most heavily invested in their existing Hydrography data sets are ECY, WDFW and DNR. Of these three, the migration to NHD will have the greatest impact on DNR's business. ECY has already migrated to NHD. WDFW's migration is proceeding as funding allows. An estimated $120,000 (one-time cost) is needed to complete the WDFW migration. The cost of the technical work to migrate DNR hydrography and related attributes to NHD is estimated to be $4.5 million. The business costs of DNR's migration have not been estimated.

- Governance – Governance of the NHD was a significant concern for the agencies and their stakeholders.. Through a series of meetings, data stewards from state agencies (ECY, WDFW, DNR), federal agencies (USFS, USBLM), and others (NWIFC) developed a set of "integration rules" that govern data stewardship across the state, especially addressing areas of overlapping jurisdictions and associated areas of influence. These integration rules will be living documents that continue to evolve. For instance, integration rules between DNR and USFS have been established for western Washington, but different rules are likely needed for eastern Washington. Establishing the NHD as the Washington state Hydrography layer

commits the state to coordination and cooperation with the federal agencies also using the NHD. The USGS is the ultimate steward of the NHD. There is an MOU establishing roles and responsibilities between the USGS and the Pacific Northwest Hydrography Framework group. In turn, an MOU between the PNWHF partners outlines the roles and responsibilities among the partners, which include Washington state. Governance of a shared Hydrography data set within Washington state was first addressed by ECY, WDFW and DNR as part of an Interim Hydrography Data Charter. The interim governance structure was presented to the ISB-GIT at its July 26, 2007.

4. Recommended Solution

- The state should adopt the U.S. Geological Survey (USGS) National Hydrography Dataset (NHD) as the data standard for all surface water (hydrography) geospatial datasets in Washington state
- The NHD stewarded by the Washington Dept of Ecology (ECY) will be the state standard for linework, points, areas, stream routing, and NHD defined attributes representing surface water hydrography.
- Agencies shall use the NHD for newly designed or significantly redesigned agency geographic information systems.
- Agencies may use alternative surface water conventions and structures provided:
    - The agency maintains a version of hydrographic features which preserve spatial consistency with NHD geometry currently published by ECY.
    - Any hydrographic variations introduced by the agency are posted to the USGS managed National NHD repository and made available in the next publication cycle.
    - The agency maintains a version of hydrography related attributes for ISB-GIT defined significant geo-datasets which can be accurately mapped to the ReachCode routing system contained in the currently published ECY version of the NHD.
- Recognizing that migration to this standard may require a significant amount of time and money, adherence to this standard by individual state agencies and organizations is subject to the availability of funding.

4.1. Assumptions

Until the state has funding to completely migrate, agencies may use alternative surface water conventions and structures provided:

- The agencies actively participate in the proposed shared governance model and openly communicate current and future strategies.
- When possible and as opportunities become available, agencies modify portions of their datasets to facilitate eventual migration to the NHD.

See Appendix B: Implementation Plan

4.2. Other Alternatives Considered

4.2.1. Alternative A - Continue to use same data and processes

- Do nothing. Continue to use same data and processes.

- Alternative A results in hindering cross-agency data sharing and decision making which results in errors, unnecessary misunderstandings and conflicts , and continues the duplication of effort required to manage three different state-wide data sets and is confusing to the public.

4.2.2. Alternative B –

- All state agencies with the exception of DNR should adopt the state standard NHD. DNR would maintain their current stream layer, but migrate to a non-NHD geodatabase model. DNR has a requirement to convert their Forest Practices hydrography coverage data to a geodatabase format, but is unable to begin migration to the NHD data model in the near future due to the cost of migration as well as to requirements included in the Salmon Recovery Act of 1999 (Forest and Fish Law).
- Alternative B has the significant disadvantage in that DNR hydrography attributes would not be easily shared with other agencies adopting the NHD data model, resulting in increased staff time to utilize DNR data and increasing the potential for costly and embarrassing errors.

4.2.3. Alternative C –

- Adopt the NHD data model as the state standard, but hold off complete migration to the NHD until statewide LiDAR is available. Develop an agreement between Federal and State agencies for joint development of High-Resolution LiDAR derived hydrography for inclusion into the NHD.
- Alternative C also maintains the status quo for several years, hindering cross-agency data sharing and decision making which results in errors, unnecessary misunderstandings and conflicts , and continues the duplication of effort required to manage three different state-wide data sets and is confusing to the public.
- Alternative C has the advantage of significantly increasing the accuracy of the state-wide hydrography layer, though this might not occur for several years.

4.2.4. Alternative D –

- Develop a new statewide proprietary hydro dataset based on DNR's Forest Practices hydrography data layer, which would be utilized across all agencies.
- This option results in a common hydro layer for state agencies but negates all other advantages of adopting the NHD as the common hydro model and ignores Ecology's requirement to report impaired waters to the EPA using the NHD.

5. Cost and Benefit/Impact Analysis

5.1. What are expected costs to implement the standards?

- Ecology – minimal impact as Ecology has already adopted the NHD as its hydrography data standard and has already transferred a significant portion of its attribute data to the NHD. ECY has committed $120,000 annually for in-kind services as state data steward.
- WDFW – Estimates a need for $200,000 as a one-time cost to convert.
- DNR –

- The work associated with aligning the DNR and NHD stream locations and migrating DNR stream attributes (including water type) to the realigned stream locations has been estimated to cost $4.5 million. This does not include the business costs of vetting the changes with the Forest Practices' water typing stakeholders.
- There will be on-going costs for an additional FTE (ITS4 - approximately $156,000 per biennia) at DNR to support NHD data updates and business processes. This is due to the increased complexity of NHD edits (over the current data model) and the additional layer of data review that will be required with NHD stakeholders. DNR handles thousands of water type modification requests that change the location of nearly 3,000 streams each year. This is hundreds of times the update volume of the other natural resource agencies. Given this workload, DNR will not be able to fold the additional overhead and complexity of NHD edits and the additional coordination between forest practices stakeholders and NHD stakeholders into existing staffing levels.

5.2. What are the impacts of the proposed data standards?

- Migration to NHD poses significant operational challenges for DNR. The DNR hydrography database is synonymous with the Forest Practices' fish habitat water typing system. The water typing system is governed by the Forests and Fish stakeholder process that includes DNR, ECY, WDFW, tribes and landowners in review of all proposed changes to DNR hydrography data. A migration to NHD will result in major changes to stream locations in approximately 30% of the watersheds in the state. These changes will have to be vetted with the water typing stakeholder group.
- Integration rules between DNR, ECY, WDFW, the U. S. Forest Service and BLM hydrography data have been worked out for the west-side of the state but not yet for the eastside. We do know that the current depiction of streams in the DNR hydrography dataset and the Forest Service dataset on the eastside of the state are significantly different. Reaching agreement on integration rules will be very challenging.

6. Governance

6.1.1. Roles and Responsibilities

Outlined in the table below is a list of the groups that will have roles in the governance of the WA State Hydrography Data Standard. There is a brief description of each of the groups and their associated roles and responsibilities. The support and participation of these groups is critical to the success of this standard. See Appendix D for an illustration of the groups and their relationships.

Participants	*Description*	*Role*

Information Services Board/ Geographic Information Technology Committee (ISB/GIT)	**Provides executive sponsorship and leadership.** This standing committee of the Information Services Board (ISB) is charged with representing the strategic interest of a coordinated, enterprise approach to using geographic information technology and, providing leadership for the implementation of cost-effective, collaboratively-developed, spatial data management solutions. Membership includes representatives from the United States Geological Survey (USGS), the Washington State Geographic Information Council (WAGIC) and the following Washington state departments: Transportation (DOT), Ecology (ECY), The Military (MIL), Health (DOH), Information Services (DIS), Natural Resources (DNR) and Fish and Wildlife (DFW).	Responsibilities: • Supports and facilitates funding for State Hydrography; • Provides oversight; • Serves as advocate for WA Hydrography Data Standard Set and the responsible staff; • Eliminates obstacles to success of the WA Hydrography Data Standard Set; • Provides policy direction.

ISB/GIT Washington State Hydrography Steering Committee	Steering Committee members provide guidance and oversight in the maintenance and management of Washington state hydrography data. Members represent the business interests of their respective agencies. The committee also ensures that sufficient resources and staff are available. The Washington State Hydrography Steering Committee will be composed of: • A representative of the WA Department of Ecology (ECY) • A representative of the WA Department of Natural Resources (WDNR) • A representative of the WA Department of Health (WDOH) • A representative of the WA Department of Fish and Wildlife (WDFW) • A representative of the US Bureau of Land Management (USBLM) • A representative of the US Forest Service Region 6 (USFS) • A representative of the Northwest Indian Fisheries Commission (NWIFC) • The Washington State GIS coordinator • Other representatives may be appointed by the ISB GIT.	Responsibilities: • Guides, reviews, and approve process changes; • Ensures that staffing is available within their agency to support their responsibility for maintenance and management of the NHD for Washington state.; • Resolves disagreements and deadlocks encountered between agencies and other stakeholders; • Directs staff to perform the duties in maintenance and management of NHD in the state, in cooperation with the PNWHF; • Ensures that their agency gets what they need from the process and provides what is agreed to; • Commits staffing support for State Hydrography Technical Working Groups, as needed. The need for these groups, to support technical projects, is determined by the Agency Stewards Team. • Acts as a liaison to the ISB/GIT

State Hydrography Steward	Provides the key leadership role for maintenance and management of NHD in Washington The State Hydrography Steward insures that hydrography issues are coordinated and communicated between the State Hydrography Agency Data Stewards. The steward agency will help build consistency across the state for the use of the NHD based on agreed-upon protocols. The steward agency will act as the PNW Hydrography Framework point-of-contact and as the contact for other external agencies, such as the USGS NHD data steward and local governments. Steward Agency: WA Department of Ecology (ECY) *Specific Staff assignments will be made by the agency.*	Responsibilities: • Leads the NHD implementation in Washington state; • Leads the Agency Stewards Team; • Coordinates with participating agencies for shared maintenance of NHD in the state; • Acts as the primary liaison to the ISB/GIT Washington State Hydrography Steering Committee ; • Coordinates with external agencies and committees, including PNWHF, NHD, local government; • Leads communication among all participants and stakeholders regarding Washington state Hydrography; • Creates, and is responsible for, edit management and QC for NHD in Washington; • Maintains hydrography data that is not the responsibility of any other agency (i.e. miscellaneous) • Maintains NHD software and is responsible for coordination of NHD release management; • Creates software applications to assist in NHD maintenance, including edit request application, QC applications, etc.; • Manages distribution and access of the current, published version of NHD for Washington state agencies; • Creates a yearly work plan and budget for NHD implementation in Washington.

Agency Hydrography Data Stewards	The agencies responsible for stewardship and joint management of the NHD in Washington are: WDFW DNR Ecology US Forest Service BLM including the following roles: Management Lead Technical Lead Data Editors *Specific Staff assignments and roles will be made by the agencies.*	Responsibilities • Participates on the Agency Stewards Team; • Manages creation and maintenance of hydrography data/metadata within their organization. • Ensures organization follows agreed-upon standards, protocols, and processes for providing data/metadata. • Communicates and works with the State Hydrography Steward on the documentation and resolution of technical issues, testing, solutions and maintenance of hydro data. • Coordinates with State Hydrography Steward to ensure consistency in the testing of the implementation of data update standards and protocols and solutions; •

Agency Hydrography Stewards Team	This group is made up of the Agency Hydrography Stewards and the State Hydrography Steward Management lead. The plan is to have rotating leads from the Agency Hydrography Stewards, in order to maintain energy and neutrality for the team's work.	Responsibilities: • Works with the State Hydrography Steward to support the implementation of NHD in Washington. • Provides a governance role for the work of the Agency Hydrography Stewards • Reports to the ISB/GIT Washington State Hydrography Steering Committee • Requests staff for State Hydrography Technical Working Groups, as needed.
Framework Management Group	WAGIC technical committee responsible for coordinating the development and integration of the fundamental "framework" data themes. Serves as technical resources for the ISB/GIT staff. Chairperson: USGS WA Geospatial Liaison	Responsibilities: • Provides advice, and a more global perspective, on hydrography issues. • Represent the interests of the National Map

Pacific Northwest Hydrography Framework (PNWHF) Steering Committee	The Steering Committee ensures that PNWHF activities continue to meet the needs of the PNWHF Partners and Stakeholders. This group provides oversight on project activities, scope and direction, key issues with major implications to the project, timelines, project budgets, etc. It is comprised of the PNWHF Partner representatives and key stakeholders. The Washington State Hydrography Data Steward is the primary representative for Washington State on this committee. Washington State Agency Hydrography Data Stewards are also active participants.	Responsibilities: • Meet at least quarterly. • Provide oversight on all PNWHF geospatial activities and projects in order to ensure that business needs of Partners and Stakeholders are met. • Review and reach agreement on PNWHF project requirements and promote resulting projects within respective organizations. • Provide review and promote funding support for PNWHF projects in their respective organizations. Identify and pursue available grant offerings. • Resolve technical issues and concerns through positive negotiation in order to reach consensus on resulting decisions. • Identify and maintain a contact list for PNWHF Stakeholders. On an ongoing basis, evaluate Stakeholder needs and expectations. Ensure that these needs and expectations are accounted for in PNWHF activities. • Communicate status on PNWHF activities to all other identified PNWHF groups (defined below). Provide email notifications. • Coordinate with ISB/GIT Washington State Hydrography Steering Committee on geospatial hydrography issues.

6.1.2. Maintain structure and commonality

- Agencies shall be responsible for the creation and maintenance of their event tables. Each agency will be responsible for maintaining comprehensive metadata on event tables to facilitate cross-agency use of the data.

6.1.3. Request a new or custom data field

- Agencies shall contact the Washington state Hydrography Steward to request all new or custom data fields and definitions. The State Hydrography Steward will coordinate with the NHD, PNWHF, and Washington Hydrography Technical Working Group to provide all data definitions, including those unique to Washington State.

6.1.4. Receive major updates

- Agencies will receive minor updates directly from the NHD website (http://nhd.usgs.gov/data.html). The data definitions can be updated dynamically as new definitions become available.
- For major updates, agencies will contact the Washington state Hydrography Steward to participate on a multi-agency stewardship team.

7. Document History

Date	Version	Editor	Change
September 15-16	0.1	Rick Jordan, ECY, Deb Naslund, DNR	Initial draft
October 28, 2010	0.2	Deb Naslund, DNR, Rick Jordan, ECY, Andrew Weiss DFW, Tim Young, DFW	Revisions to clarify business case, recommended alternative, shared governance, and better articulate proposed recommendation and related standards.
November 4, 2010	**0.3**	Deb Naslund, DNR, Rick Jordan, ECY, Paul Douglas, DIS	**Further revisions to clarify standard language, additions/changes to appendices, miscellaneous minor edits**

8. Glossary

Executive Sponsor - Primary business area executives for approving/endorsing business case and proposed data standards. Lead data governance team that ensures enterprise business value, alignment, and performance. Includes senior managers and one or more Executive Sponsor may exist. Typically organizes projects around major subject areas and functions of state government including lines of business. Assigns tasks to Steering Committee or similar role.

Business Sponsor/Primary Steward - Primary sponsor and/or business owner responsible for business case and proposed data standards. Agencies may have clear ownership or designated responsibility. Participates on Steering Committee, and chairs or facilitates

9. References

http://www.oregon.gov/DAS/EISPD/GEO/standards/standards.shtml

Appendix A – National Hydrography Dataset (NHD) Data Dictionary

See: http://nhd.usgs.gov/documentation.html

http://nhd.usgs.gov/NHDv2.0_poster_6_2_2010.pdf

Appendix B – Implementation Plan

The state recognizes that migration to the NHD standard may require a significant amount of time and funds and that the operational challenges required for some agencies may be much greater than for others. As stated in the recommended solution, adherence to the recommended standard by individual state agencies and organizations is subject to the availability of funding. One of the assumptions of the recommended solution is that, when possible and as opportunities become available, agencies modify or migrate portions of their datasets to facilitate eventual complete migration to the NHD.

Agencies may be able to migrate a significant portion of their stream and water related attributes to the NHD using existing in-house resources. Others may be able to partner with another state agency or with a federal agency able to provide the services required to migrate data to the NHD. Agencies may and should seek grant opportunities to fund the transfer of data to the NHD to meet federal requirements. Other agencies simply may not have the ability to migrate to the new standard until funding opportunities become available.

The following agencies are all sponsors of the proposed adoption of the NHD standard and have been attempting to seek funding opportunities from various sources to facilitate migration of agency data to the NHD.

- Department of Ecology has been actively migrating hydrography data to the NHD for the past two years and will continue to transfer additional data to the NHD.

- Department of Health, working with Ecology, has begun migrating drinking water source data to the NHD and has identified additional data sources for migration. Ecology will assist DOH with the data migration or provide training in the use of event migration tools.
- Department of Fish and Wildlife is in the initial stages of transferring fish distribution and salmonid species attributes to the NHD. Additional stream related attributes have also been identified for migration.
- The Northwest Indian Fisheries Commission has indicated that they will begin migration of their stream data to the NHD this fiscal year.
- Department of Natural Resources has the biggest challenge of all the agencies because their stream layer is significantly different from the NHD on and near federal land and because of the concurrence process with their stakeholders which is required when changing stream alignments. Because of this, DNR does not have immediate plans to migrate their stream attributes to the NHD.

The Department of Ecology currently maintains a copy of the NHD to meet its business needs. As edits are made to the NHD, Ecology periodically updates the dataset to keep it current. To comply with the proposed standard, Ecology will provide access to this dataset to all agencies and will update it on a schedule to be determined by the state Hydrography Steering Committee.

As agency hydrography events are created and made available to the public or to other agencies, the publication dates of the NHD events and the NHD dataset hosted by Ecology will be synchronized to assure that events are newer than the ReachCode on which they are mapped.

Appendix C - Primary Stakeholders

The primary stakeholders affected by this standard include:

- Washington state agencies that manage hydrography geospatial data, such as:
    - Department of Ecology
    - Department of Fish and Wildlife
    - Department of Natural Resources
    - Department of Health
    - Department of Transportation
- Federal agencies participating in the Pacific Northwest Hydrography Framework Partnership, including:
    - Bureau of Land Management
    - U. S. Forest Service
    - Natural Resources Conservation Service
    - U. S. Geological Survey
- The Northwest Indian Fisheries Commission (NWIFC)

Other stakeholder groups in Washington include the GIS user community in federal and state agencies, regional organizations, counties, cities, tribes, educational institutions, utilities, and the private sector.

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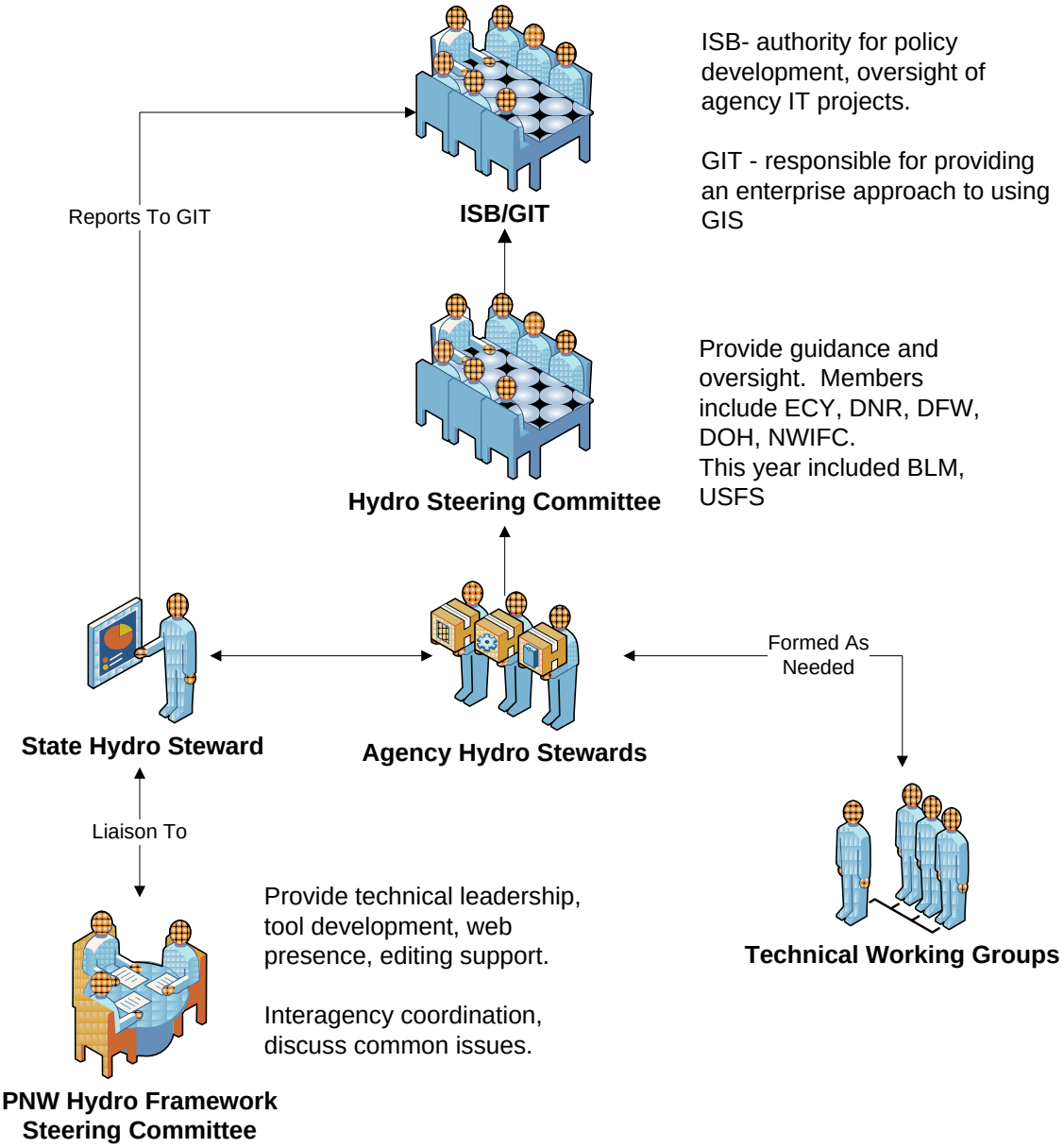
Appendix D: Washington State Hydrography Maintenance Roles and Responsibilities

The following graphic provides a high level view of the roles in the governance of the WA State Hydrography Data Standard. See section 6.1.1, above, for detailed descriptions and associated responsibilities.



The USGS is the owner and primary data steward of the NHD. USGS roles and responsibilities for maintaining the NHD are included in a Memorandum of Understanding between the PNWHF and the USGS. To review the MOU, go to http://webhosts.cr.usgs.gov/steward/, click on WA state, and the select the link to view the MOU document.

APPENDIX E: Pacific Northwest Hydrography Framework Governance and Stewardship Roles and Responsibilities

Background

This document specifies the major roles and responsibilities that are required for successful management of the Hydrography Framework in Oregon and Washington. In many cases, the roles may be fulfilled by more than one organization or by different organizations at different levels of geography or jurisdiction within the region. Not all roles and responsibilities will apply to all partners and stewardship roles and responsibilities may be implemented in different ways in the various PNW Hydrography Framework (PNWHF) Partner organizations.

For the purpose of this document, the phrase "Hydrography Dataset" is inclusive of hydrographic features such as streams, lakes, and reservoirs as well as the hydrologic units such as watershed or subwatershed that encompass those features. Initially this encompasses the National Hydrography Dataset (NHD) and Watershed Boundary Dataset (WBD) for Oregon and Washington. A strong relationship exists between the PNWHF and the individual State Framework organizations. Roles defined below interact at appropriate levels within these state framework organizations.

Identified roles include those of Steering Committee, Agency Data Steward, Local Data Steward, State Coordinator, Hydrography Theme Management Board, Clearinghouse Administrator, Technical Advisory Committee, Executive Guidance/Sponsor, and Stakeholder.

This document uses the following definitions of Data Governance and Data Stewardship as guidance (Robert Seiner 2006 - http://www.tdan.com/view-articles/5037):

- *Data Governance: The execution and enforcement of authority over the management of data assets and the performance of data functions.*
- *Data Stewardship: The formalization of accountability for the management of data resources.*

At a high level, The PNWHF Framework Partners agree to adopt the following change management process in order to ensure that their stewardship responsibilities are fully met:

- Communicate all planned edits for lands under their jurisdiction to affected partners and stakeholders.
- Consider edits proposed by other agencies and organizations for lands under their jurisdiction and decide authoritatively if the change will be accepted or not.
- Recognize that overlapping stewardship responsibilities may exist between land management and regulatory Partner organizations.
- Communicate final decisions regarding proposed edits.
- Decisions can be appealed to the Theme Management Board for resolution.

Role #1 PNWHF Steering Committee

Definition: The Steering Committee ensures that PNWHF activities continue to meet the needs of the PNWHF Partners and Stakeholders. This group provides oversight on project activities, scope and direction, key issues with major implications to the project, timelines, project budgets, etc. It is comprised of the PNWHF Partner representatives and key stakeholders.

Responsibilities:

- Meet at least quarterly.
- Provide oversight on all PNWHF geospatial activities and projects in order to ensure that business needs of Partners and Stakeholders are met.
- Review and reach agreement on PNWHF project requirements and promote resulting projects within respective organizations.
- Provide review and promote funding support for PNWHF projects in their respective organizations. Identify and pursue available grant offerings.
- Resolve technical issues and concerns through positive negotiation in order to reach consensus on resulting decisions.
- Identify and maintain a contact list for PNWHF Stakeholders. On an ongoing basis, evaluate Stakeholder needs and expectations. Ensure that these needs and expectations are accounted for in PNWHF activities.
- Communicate status on PNWHF activities to all other identified PNWHF groups (defined below). Provide email notifications.
- Coordinate with State Framework organizations on geospatial hydrography issues.

Role #2: Agency Data Steward

Definition: The Hydrography Agency Data Steward has ultimate responsibility for all aspects of hydrography data production and maintenance for their organization. The Agency Data Steward enables Local Data Stewards and/or their data editors to locally coordinate and manage geospatial data and metadata production.

Responsibilities:

- Manages creation and maintenance of hydrography data/metadata within own organization.
- Ensures organization follows agreed-upon PNWHF data standards, protocols, and processes for providing data/metadata to the Clearinghouse.
- Communicates with participating partner organizations on planned data updates and maintenance and coordinates with other Agency Data Stewards to eliminate redundant and/or competing production/maintenance efforts.
- Coordinates with other PNWHF partners to ensure consistency in the implementation of data update standards and protocols.
- Provides vertical stewardship role in order to promote appropriate level of integration between hydrography and hydrographic unit boundary datasets.
- Promotes participation in the PNWHF.
- Encourages new data partnerships.
- Serves as organization's representative on the Theme Management Board.

Role #3: Local Data Steward

Definition: The Local Data Steward is responsible for all aspects of hydrography data production and maintenance for their local jurisdictional area. The Local Data Steward either completes the work or enables their data editors to coordinate geospatial data and metadata production.

Responsibilities:

- Creates and maintain hydrography data/metadata within agreed-upon areas of responsibility.

- Follows agreed-upon PNWHF data standards, protocols, and processes for providing data/metadata.
- Provides vertical stewardship role in order to promote appropriate level of integration within the Hydrography Dataset.
- Communicates with other local data stewards in adjoining or overlapping areas of responsibility on planned data updates and maintenance.
- Coordinates data production/maintenance activities within own organization and with Local Data Stewards in other partner agencies/groups.
- Encourages new data partnerships.

Role #4: State/Agency Coordinator

Definition: The states of Oregon and Washington are represented in the Partnership by the coordinating agency within each state. An individual will be appointed by the respective state to serve as the State Coordinator. Each federal agency partner will be represented in the Partnership by a Federal Agency Coordinator. The State/Agency Coordinator serves as liaison between the other State Partners, the Framework Partners, and the Clearinghouse Administrator. The State/Agency Coordinator serves as a point of contact so that the State or Agency Partners can effectively participate in the PNWHF Partnership.

Responsibilities:

- Represents the needs and views of their state or federal agency to the PNWHF Partnership.

- Serves as a conduit for information flow between the state or federal agency Partners and the PNWHF.
- Facilitates the review of PNWHF initiatives among the various state or federal agency Partners.
- Encourages cooperation between Partners in support of PNWHF initiatives.
- Encourages new data partnerships in support of PNWHF initiatives.

Role #5: Hydrography Theme Management Board

Definition: The Hydrography Theme Management Board (Board) provides an important leadership role for the PNWHF. Membership consists of the Agency Data Steward from each PNWHF Partner organization. Each organization has a seat on this Board. A chairperson will be appointed by the Board.

This Board ensures data consistency, coordination and protocol implementation for the PNWHF. It ensures consistency across the state(s) for the stewardship of the PNHWF Hydrography Dataset following agreed-upon protocols for communication and coordination. The Board resolves conflicts and issues that are brought forward by the Agency Data Stewards or the Clearinghouse Administrator that cannot be resolved at a lower level.

Responsibilities:

- Appoints a chairperson for the Board.

- Convenes meetings of the Board as needed. Promotes consistency in all aspects of the PNWHF implementation of the Hydrography Data (e.g. guidance on hydrography stream densification, required versus recommended attributes, etc).
- Resolves conflicts and issues that are brought before the board.
- Reviews requirements for additional PNWHF data development and functionality.
- Reviews requirements and procedures for the maintenance of the Hydrography Dataset.

Role #6: Hydrography Framework Clearinghouse Administrator

Definition: The Clearinghouse Administrator provides a variety of functions related to administrative oversight for the PNWHF Clearinghouse. Key responsibilities may include the following based on agreement among the Partners:

Responsibilities:

- Maintains appropriate links to Partner web sites and makes the PNWHF geospatial data holdings available to appropriate web portals.
- Provides Clearinghouse help desk/training assistance.
- Provides geographically referenced, up-to-date contact information for State/Agency Coordinators, Agency Data Stewards, Local Data Stewards, and Area Data Managers.
- Provides public distribution of regionally integrated PNWHF data and associated metadata according to agreed-upon standards and protocols.
- Implements appropriate system security.
- Notifies Agency Data Stewards, Local Data Stewards, State/Agency Coordinators, and editors of any system down time and expected recovery time.
- Provides email notification to Agency Data Stewards, Local Data Stewards, State/Agency Coordinators, and editors when updates have been posted to the Clearinghouse.
- Coordinates development or purchase of new or additional software/hardware when needed to meet the needs of PNWHF Partners and users.
- With Partner funding support, provides hardware/software infrastructure maintenance and upgrades for the Clearinghouse.
- Provides system/network administration for the Clearinghouse.
- Adheres to agreed upon PNWHF decision-making process.

Role #7: Technical Advisory Committee

Definition: The Technical Advisory Committee (TAC) consists of appointed technical experts in systems, networks, and hydrography data implementation. The TAC resolves technical issues that impact the PNWHF with respect to data quality, technical standards, application requirements, procedures, and protocols for data maintenance. The TAC committee provides technical recommendations to the Agency Data Stewards, Hydrography Theme Management Board, and the Clearinghouse Administrator.

Responsibilities:

- Meets as needed, usually as small work groups to solve specific PNWHF technical issues.
- Defines technical editing process/protocols.

- Defines security requirements for PNWHF database.
- Develops/maintains procedures for posting data to the PNWHF Hydrography Dataset. .
- Develops system network technical administration procedures.
- Identifies/develops tools for data integration including quality control/assurance.
- Provides support for application (or tool) enhancements.
- Develops procedures for implementing data requirements and functionality.
- Identifies hardware/software requirements.

Role #8: Executive Guidance/Sponsors

Definition: The Executive Guidance Sponsors role is comprised of advocates within each partner organization. Sponsors provide organizational leadership, policy direction, and oversight from the perspective of their organization. They have a vested interest in the successful development and maintenance of the PNWHF and are committed to providing an appropriate level of support for its success. Sponsors normally have decision authority (at the management level) and approve organizational and funding resources to support the PNWHF based on recommendations from the Theme Management Board.

Responsibilities:

- Provides necessary funding/resources.
- Provides oversight.
- Serves as advocate for PNWHF.
- Eliminates obstacles to success of PNWHF.
- Provides policy direction.
- Identifies appropriate decision making process.

Examples:

CIO of state/federal agency

Executive Director for regulatory programs

Role #9: Stakeholders

Definition: The group of individuals and organizations who are actively involved in the PNWHF effort, or whose interests may be positively or negatively affected by the results of the project. Different groups of stakeholders exist and their responsibilities vary by group. In addition, a complex relationship between the PNWHF Partners and their respective stakeholders exists. Below is a high level overall summary of the PNWHF Stakeholder role.

Responsibilities:

- Participates in the PNWHF effort at a level appropriate to the needs of their specific stakeholder organization in order to ensure that the project is successful from their point of view.
- As appropriate, provides input on requirements, scope, and direction of PNWHF initiatives.
- Responds to mailings and notifications where stakeholder input or feedback is requested.
- Provides funding to the PNWHF effort in response to anticipated benefits to be realized by their specific stakeholder organization as a result of successful implementation and ongoing management of these hydrography geospatial datasets.

Examples:

WA State Dept of Transportation

US EPA

OR Dept of Environmental Quality

Tribes

Counties

Cities

The following graphic provides a high level view of the PNW Hydrography Framework (PNWHF) organization. See above for detailed descriptions and associated responsibilities.